Koch, Kristine

From: King, Todd W. <KingTW@cdmsmith.com>
Sent: Wednesday, January 22, 2014 3:58 PM
To: GAINER Tom; Humphrey, Chip; Koch, Kristine
Cc: MCCLINCY Matt; PARRETT Kevin; poulsen.mike@deq.state.or.us; PETERSON Jenn L; Rood, Stephen; Gustavson, Karl; Blischke, Eric; Penoyar, Susan
Subject: RE: hot spots

Oh man…I was writing up a nice memo and everything…but since you asked…here is what I'm thinking…

I'm using Table 40 from ODEQ regs effective date 10/17/2011

AWQC values are the lowest of the human health values (Water + Organism vs. Organism Only) all same except for BaP

The Aquatic Life Criteria value (Enclosure 4 Table 20, Freshwater) are much higher…

So…from Table 40: AWQC values are (all in ug/l):

PCB 0.0000064 ug/l
BaPEq 0.0013 ug/l
DDx conversion using DDx to DDE and DDT correlations from sediment

4-4' DDE 0.000022 ug/l
4-4' DDT 0.000022 ug/l

PeCDF – divide by TEF (0.5) to get AWQC based on 2378 TCDD value of 0.00000000051 ug/l or 1.02 E-9 ug/l

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Koc from EPA SSL Guidance
http://www.epa.gov/superfund/health/conmedia/soil/pdfs/part_5.pdf

Table 38 Geomean , measured (as opposed to calculated from Kow, when avail)

BaP 9.69E05
DDD 4.58E04
DDE 8.64E04
DDT 6.78E05

PCB 3.09E05 (calculated from Kow Table 39)

TCDD and PeCDF calculated from Kow according to log Koc=0.00028+0.983 log Kow (Di Toro, 1985, Eq 70 from above link)
Log Kow TCDD = 6.92 ref: ATSDR Tox Profile Chlorinated Dibenzo Dioxins Dec 98, Table 3.2
Log Kow PeCDF = 6.8 ref: ATSDR Tox Profile Chlorinated Dibenzo Furans May 94, Table 3.2

Calculated Koc

23478 PeCDF = 6.36E06
2378TCDD = 4.84E06

So…that's about as far as I am.

Once Steve gets me the TOC values, I plan to show maps as a ratio of the equilibrium pore water concentration / AWQC calculated from interpolated surface concentrations and TOC.

Cwater = Csediment/(frac TOC * Koc)

And I'll plot Cwater/AWQC to get maps similar to the high concentration maps we did for sediment/PRG

For 4-4'DDT and 4-4'DDE I'm using the correlation we developed relative to DDx to expedite calculations…

CsedDDT=10^-.536*CsedDDx^0.92
CsedDDE=10^-.321*CsedDDx^0.736

Will do DDD if y'all think necessary.

Talk to you tomorrow.

TK

From: GAINER Tom [mailto:GAINER.Tom@deq.state.or.us]
Sent: Wednesday, January 22, 2014 6:18 PM
To: 'Humphrey, Chip'; Koch, Kristine; King, Todd W.
Cc: MCCLINCY Matt; PARRETT Kevin; POULSEN Mike; PETERSON Jenn L; GAINER Tom
Subject: RE: hot spots

Todd-
In mapping highly mobile sediment hot spots, both aquatic life and human health (organism consumption) AWQC criteria should be used. If AWQC are not available, acceptable risk levels from the baseline risk assessments should be used. We also assumed that there are appropriate and acceptable portioning coefficients from the RI that can be used. Along with maps you create for highly mobile hotspots, please identify the AWQC and K values and their sources.

Thanks-
Tom

From: GAINER Tom
Sent: Thursday, December 05, 2013 9:56 AM
To: 'Humphrey, Chip'; Koch, Kristine
Cc: MCCLINCY Matt; PARRETT Kevin; GAINER Tom; 'KingTW@cdmsmith.com'; POULSEN Mike; PETERSON Jenn L
Subject: hot spots

Chip and Kristine-
During our meeting on 11/7/13, we discussed an approach to identifying hot spots in Portland Harbor. For highly concentrated hot spots, we agreed to map hot spot sediment concentrations for the four RAL COCs, and then if necessary for particular COCs, plot isoconcentrations of various multiples of the hot spot concentration (e.g., for PCBs, where the hot spot concentration will "light up" the entire project area). DEQ agreed to confirm appropriate hot spot sediment concentrations; they appear in the table below and are based on the EPA-generated and -selected PRGs (the risk-based RAO 2 concentration was selected for PCBs, since the PCB PRG is a background concentration). DEQ notes/comments on these PRGs/hot spots are provided at the end of this email.

COC	Hot Spot Sediment Concentration (mg/kg)
Total PCBs	0.001
2,3,4,7,8-PeCDF	9E-07
Total DDx	0.028

Total cPAH (BaP Eq) 5

As we discussed, please plot out these sediment concentrations harbor-wide for each of the four COCs as a starting point to identify workable highly concentrated hot spot areas.

To identify highly mobile sediment hot spots for the same four RAL COCs, we agreed to use AWQC values and sediment-water equilibrium coefficients (from the RI) to calculate sediment concentrations that would be plotted as described above.

Please contact me if you have questions, and provide a schedule to produce the first set of plots. Note that I will be out of the office 12/16-1/3; please contact Kevin Parrett on this matter during my absence.

DEQ notes on the PRGs/Hot Spot Concentrations

PCBs. The lowest sediment risk-based value is for subsistence fisher infant exposure based on noncancer effects.

Hot spot = 0.1 ug/kg x 10 (noncancer effects) = 1 ug/kg = 0.001 mg/kg

EPA developed their potential risk-based PRGs by reversing the calculations in the HHRA. In doing so, they do not apply an infant risk adjustment factor (IRAF) used in the original risk calculations. For PCBs, this means they use the RfD for chronic exposure and apply it to subchronic infant exposure. I do not agree with this approach. On a practical basis, the chronic/subchronic factor is 2/3, and does not change the risk-based value substantially (the hot spot level may be 50% greater).

2,3,4,7,8-PeCDF. The lowest sediment risk-based value is for subsistence fisher infant exposure based on noncancer effects.

Hot spot = 9×10^{-5} ug/kg x 10 (noncancer effects) = 9×10^{-4} ug/kg = 9×10^{-7} mg/kg

Similar to PCBs, for dioxins, EPA does not apply an IRAF that incorporates subchronic/chronic RfD differences used in the original risk calculations. They do, however, use toxicity factors for dioxins that are more recent than those used in the HHRA. Overall, though, the PRG overestimates risks to infants. The next highest PRG is for adult subsistence fishers (0.0001 ug/kg). It is based on cancer effects, which would mean the use of a hot spot factor of 100, rather than the factor of 10 for noncancer effects. The resulting hot spot level would be 1×10^{-5} mg/kg.

DEQ does not understand how EPA intends to apply the PeCDF PRG. It is unclear if the PRG is a TEQ for PeCDF, or whether it has been modified to represent a total dioxin/furan TEQ based on LWG regression equations.

DDX. The lowest PRG is based on ecological effects on osprey eggs.

Hot spot = 2.8 ug/kg x 10 (ecological effects) = 28 ug/kg = 0.028 mg/kg

cPAHs. The lowest in-water sediment value is for cancer effects in subsistence fishers. We base our hot spot level on a 10^{-6} risk level x 100 = 10^{-4} excess cancer risk.

Hot spot = 5,000 ug/kg (10^{-4} excess cancer risk) = 5 mg/kg

There is a lower 10^{-4} excess cancer risk level of 1,000 ug/kg (1 mg/kg) for recreational beach users. It is not clear if we intend to set levels for in-water sediment to protect beach sediment from river deposition.

Thanks-

Tom Gainer, P.E.
Project Manager/Environmental Engineer
Oregon Department of Environmental Quality, NW Region
503-229-5326